

Minister's task force on senior high school mathematics

- Revised Grade 11 curriculum to be implemented September 2006
- Grade 12 curriculum: rewritten over summer 2006, and implemented Sept 2007
- Revised curriculum students enter university September 2008.

Process

- Task force struck in Feb 2006 in response to concerns raised about curricular proposals. Report delivered Apr 2006 & now on web.
- Review of feedback received by ministry
- Interviews with reps from a broad set of sectors: CODE (engineers), industry, COU, colleges, teachers, many others

Timetable

- Asked for university committees to be struck over summer 2006, to be ready to start evaluating proposals when released in September 2006. Drafts exist now.
- Recommended two-phase release: general description (public) as well as detailed curriculum (for confidential review)

Timetable

- October 31, 2006: Decision about and announcement of university entrance requirements expected, through OUCA
- November/December 2006: High schools schedule courses and prepare advising material
- Winter 2007: High school students select courses for following year.

Problems with Geometry & Discrete Mathematics

- Small enrollment - not offered everywhere
- Students perceive tenuous link between course content and success at university
- Elite course, hard to succeed
- Engineering programs dropping it as a requirement

Problems with Advanced Functions & Intro. Calculus

- Space needed to be found in course to insert trigonometry.
- But the course was already overcrowded - compare with old grade 12 course ...
- Math depts report increase in students with at most a superficial understanding.
- Students with AFIC + GDM are well prepared, but there are fewer such students.

Problems with AFIC

- Students have a whole year less time to practice basic algebraic skills, and it shows.
- Ontario students take calculus as a 4th high school math course (after 9/10/11).
Elsewhere in Canada or the U.S. it is a 5th course (after general grade 12 math).

Recommendations

- 4th course will be Advanced Functions.
- 5th course will be Calculus & Vectors. As a Pre/co-requisite (eg non-semestered schools)
- GDM ceases to exist but vectors content absorbed into new 5th course
- Math of Data Management maintained - an excellent course for students not targeting engineering or closely related subjects. Working group looking at revisions/improvements

Implementation

- Is workable - other provinces have the calculus content (not vectors). Alberta requires it for eng. BC/Man./Sask most eng. students have it.
- Calculus is perceived by Ontario students to have a tight link to university success - enrollment will drop, but hopefully not much. MDM drops too?
- Students will have a deeper knowledge of fundamentals, & problem solving schools, so will be better prepared for further math study

Implementation

- Engineering programs are expected to require Calculus & Vectors as an entrance requirement, right from the start. In Science it'll probably be a mixture.
- If it is required, schools can/will offer it.
- Recommended transitional \$ support for small high school classes, to allow the course to get established. Happening?

Implementation

- Some rural students may still not have access to the 5th course. Recommendation was that universities pay attention to alternate pathways for students seeking admission to engineering. Eg Alberta model of parallel science program and 2nd year transfer to engineering.

Additional points

- Universities asked to coordinate decisions about entrance requirements, and that meeting timelines be worked out over summer 2006 to make this feasible.
- 1st year of dbl cohort was atypical, so only have two years of real data. But decision were needed now, & this SHOULD work.

Task force members

- Tom Salisbury - former math chair at York; Fields Institute; CMS president
- Andre Ladouceur - retired head, college Catholique Samuel-Genest; past president of AFEMO; PM's award for teaching excellence
- Beverly Farahani - OAME director; Math head at Kingston high school

Task force members

- Husein Panju - grade 12 student & trustee
- Manon Lemonde - Past president, Parents partenaires en education.
- Consultant - Wendy Hayes, Apple Canada.
- Ministry support: Anthony Azzopardi, Jaques Theoret, Linda Heaver, Ruth Swan, Monica Paabo, Jim Dorey, Alexis Ungerman, Shirley Dalrymple, and others.

Sample of interview comments

- Alternative proposal out of Waterloo area - go back to OAC type model. But also encourage 2nd grade 11 Math course – further study?
- Strong feelings about retaining calculus – a defining course for teachers
- Ontario competitiveness depends on research & innovation - don't let us fall behind.
- Competition for engineers is global - US/China/Australia/India

- MDM needs more rigour - functional viewpoint belongs in statistics
- MDM Project evaluation uneven or off base
- Small/rural school problems even more pronounced in French system
- Problem solving is key, not curricular topics. Calculus is a vehicle for problem solving, not just a set of techniques.
- Geometry has been lost in the race to calculus - eg teacher candidates, physics, engineers. 3D stuff matters to many.

- E-learning may help with some rural schools, but won't work for many students.
- MDM appeals to students who mightn't otherwise take 12U math. Relevant.
- Shortage of engineers. Ontario is behind Alberta and even more so Quebec? Quebec is a year ahead (but higher dropout rate).
- BC calculus varies a lot from school to school. UBC gives extra time (1hr/wk) to students without calculus, but is not enough

- Ask for more relevance/groundedness:
Aboriginal community needs supplemental material. Bankers want more financial content - lack skills to read an annual report.
- University adaptation to last curricular change was uneven. VPs will press for a better job this time.
- College Tech is the course colleges want, but can't demand it with current enrollment

- Freezing 9/10 then 11 then 12 is nuts, though pressures drove it that way. Should all be considered together.
- Review process is rich to those inside, but opaque to those outside. Slower, with more public comment would generate more buy-in, less frustration.
- Not just a review every 5 years - there should be an ongoing dialogue.
- Students should enjoy math - we need them to see that side of it.

- More in-service support is needed. Eg for Vectors, problem solving, statistics.
- Extent/animation of responses is a sign of the importance attached to math/calculus
- Math preparation has slipped since OAC, particularly in algebraic skills. Revision will support more students better, while still leaving calculus available for students going into mathematically intensive programs.

- If universities don't pay attention to what's in the curriculum, teachers will shift to teaching what they think universities expect their students to know, and not the actual curriculum. When that happens, what's taught will vary from school to school, which is an even worse problem for universities. Consistency requires that we listen to what's in the curriculum.

- Fields involvement: soliciting good university feedback in summer '05. Vectors&Calculus is a proposal out of COU (Taylor/Whiteley), and has benefited from Fields forum feedback.